

Knowledge Sharing, Control Mechanisms and Intellectual Liabilities in knowledge-intensive firms

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Abstract: Intellectual capital (IC) and knowledge sharing (KS) are key elements for fostering firm value, especially in knowledge-intensive firms. Management Control Systems (MCSs) have been recognized as key knowledge integrators. Recently, this assumption has been called into question as there may exist negative and destructive effects in both IC and KS fostered by a misuse of MCSs. Through a case study of 'Engineering Ltd.', this paper examines the 'dark side' issues associated by improperly implementing knowledge sharing and by imposing rules and constraints on behavior. The subject of our study, "Engineering Ltd.", is a consultancy company with 10,000 employees. The case study is used to scrutinize the major risks of knowledge sharing and to introduce possible solutions.

Keywords knowledge sharing, control mechanisms, intellectual liabilities, knowledge-intensive firms

1. Introduction

In a knowledge economy, companies increasingly compete on the basis of their knowledge and intellectual assets (Klein, 2012) and, thus, Knowledge Management (KM) and Intellectual Capital (IC) are key elements in enhancing organizational performance (Marr & Chatzkel, 2004; Ikujiro Nonaka & Takeuchi, 1995; Von Krogh, Ichijo, & Nonaka, 2000). In spite of recognizing the importance of KM and IC, the literature on KM and IC has not reached a unique definition and this leads to several approaches being considered as valid depending on the particular needs of the respective analyses (C. C. Huang, Luther, & Tayles, 2007; Marr & Chatzkel, 2004). From a general perspective, KM is concerned with knowledge acquisition, generation and sharing processes, while IC focuses on the value opportunities deriving from harnessing companies' intellectual capacity (Y.-C. Huang & Wu, 2010; Shih, Chang, & Lin, 2010). Therefore, while KM supports organizational learning flows, intellectual capital allows its storage within people, procedures or relationships (Bontis, 1999, 2005). Several studies have concentrated on the interdependency between KM and IC and have recognized the need to bring new evidence to this issue (Hsu & Sabherwal, 2012; Seleim & Khalil, 2011; Shih et al., 2010; Zhou & Fink, 2003).

So far, intellectual capital literature has looked at the effects of the management of IC to the broader process of firm's value generation. Some empirical studies have demonstrated that IC management can generate both positive *and* negative effects. The destructive side of IC, known as "Intellectual Liabilities" (ILs) has been established as a new research field (Caddy, 2000; Harvey & Lusch, 1999). ILs have been defined as "potential non-physical causes of organizational deterioration" (Giuliani, 2013, p. 129) and several barriers have been detected by which organizational performance deteriorates (De Long & Fahey, 2000; Lilleoere & Hansen, 2011; Riege, 2007).

Although the emphasis on the traditional roles of addressing organizational goals by imposing control procedures has always been recognized as an important factor in product and service innovation, a recent stream of literature finds that, under certain conditions, MCSs can restrict knowledge-oriented behaviors (Ditillo, 2004). In particular, Alvesson (1993) states that there is an ambiguous relation between the capacity to solve complex problems and the formal knowledge embedded into the mechanisms of management control. The issue is that it is very difficult to create a knowledge-oriented environment by imposing rules and constraints on behaviors. This evidence seems to suggest that MCSs can have an inhibitor role to play in contexts characterized by a high level of knowledge when they are improperly used. In order to avoid this effect, Davila (2000) suggests that MCSs should be considered as information tools rather than mechanisms devoted to reduce goal divergence.

While most studies analyze barriers that affect the effectiveness of knowledge transfer, less attention has been paid to the role and use of MCSs that shape the playing field where knowledge is shared, generated and accumulated. This

is especially true in knowledge-intensive firms where the creation and sharing of knowledge is imperative to solve complex problems by offering innovative responses to customers ; here, MCSs that are improperly used could create new obstacles , increase valueless costs and ,therefore, support the development of ILs (Grabner, 2010).

Given these premises, we can see a “dark side” of Management Control(s), when they contribute to buildup knowledge barriers and assume a counterproductive role that leads to ILs development. The aim of this study is to analyze the way in which knowledge barriers (and thus IL) can be created through the misuse of Management Control Systems. The relationships of these variables are analyzed in the realm of knowledge-intensive firms, where the greatest problems of ILs occur due to the highly amount of knowledge expertise channeled to deal with complexity and innovation. This paper is developed through study of “Engineering Ltd.” (a disguised name), a global engineering consultancy company with over 10.000 employees. The paper is organized into four sections. First, we draw together existing streams of research on intellectual capital and knowledge management in organizations. Specific attention is paid in order to give some insights into the dark side of knowledge management, intellectual capital and management control systems. Second, we have a brief review of the relevant literature, in which the relationships among KB-MCS-IL are illustrated. Third, the methodology and data analysis are described and the results from our case study are presented and discussed. In our fourth section, we discuss and summarize our main findings. Conclusions are presented in the last paragraph.

2. Theoretical background and research questions

2.1 Intellectual assets and intellectual liabilities

According to the knowledge-based theory of the firm, organizational knowledge is recognized as a competitive resource that must be managed to maximize its productivity (Grant, 1996; Nonaka, 1994). The achievement of competitive advantages and superior firm’s performances depends on the different capabilities in generating knowledge and applying it to the business activities (Spender, 1996). In addition, literature on intellectual capital focuses on the value opportunities deriving from harnessing companies’ intellectual capacity (Y.-C. Huang & Wu, 2010; Shih, Chang, & Lin, 2010). Both streams of research support the idea that a higher level of IC can increase economic value, and, it is argued, knowledge management processes should be oriented towards supporting processes that accumulate knowledge (Seleim & Khalil, 2011; Shih et al., 2010; Zhou & Fink, 2003). Thus, the management of knowledge and intellectual capital becomes a strategic issue (Klein, 2012). This is particularly true in the case of Knowledge Intensive Firms (KIFs). The literature defines as these firms that provide intangible solutions to customers by deploying the knowledge embedded in individuals, procedures, routines and databases (Alvesson, 1995). Indeed, in this type of environment, knowledge plays several roles such as: i) source of a competitive advantage (Winch & Schneider, 1993); ii) providing the company with unique products and services for customers (Alvesson, 1993); iii) developing expertise that allow the combination between products and services (Alvesson, 1993); iiiii) facilitating learning and problem solving (Starbuck, 1992).

The problem can identified by examining the multi-faceted nature of intellectual assets. Indeed, IC is a wide concept whose understanding depends on business related disciplines. Most well-known models of IC typically consist of three main elements: human capital (HC), structural capital (SC) and relational capital (RC). HC is usually described as a bundle of people competencies, experience and skills (Choo & Bontin, 2002; Guerrero, 2003; Kong, 2008). SC refers to the knowledge embedded within the organization in databases, written procedures and so on, and it supports human capital in daily activities (Aramburu & Sáenz, 2011; Roos, Roos, & Edvinsson, 1998; Stewart, 1997). RC is shaped by a bundle of formal and informal relationships that connect the organization with external stakeholders, enabling external acquisition of know-how and facilitating dialogue (Marques, José, & Caranana, 2006).

Interestingly, while the whole IC discipline reveals a remarkable heterogeneity between the various contributions that have appeared in the last decades dedicated to the strategic management of KM and IC, most authors seem to be silent on the possibility of recognizing negative effects of IC on firm performance (Garcia-Parra, Simo, Sallan, & Mundet, 2009).

Recently, a different perspective has emerged which considers explicitly the dark side of KM and IC. Three main conceptualizations are: i) a depreciation of the value of these assets (Abeysekera & Guthrie, 2004; Caddy, 2000); ii) a nonmonetary obligation (Garcia-Parra et al., 2009; Harvey & Lusch, 1999), iii) potential non-physical cause of organizational deterioration (Giuliani, 2013).

2.2 Knowledge sharing and knowledge barriers

Focusing on consultancy firms, Lilleore and Hansen (2011) revealed the existence of a significant link between knowledge sharing, types of knowledge and competitive aims. They state that those consulting firms competing through standardized-mature products rely on the reuse of existing knowledge. For these firms, the primary knowledge activities are to exploit existing knowledge making it explicit and mobilizing it throughout the organization. At the same time, Winter and Szulanski (2002) show that the replication of organizational routines is an effective way to leverage existing knowledge because of the economies of substitution linked to the reuse and the retaining of organizational knowledge bases. On the other hand, consulting firms that compete through customized and innovative products build their competitive advantage on the exploration of tacit knowledge, and their primary knowledge management activity is to foster the social interactions for knowledge sharing. In this way, knowledge sharing enables the creation of new. Nonaka & Konno (1998) specify that knowledge creation depends on the cycle of four processes (the SECI model) by converting tacit knowledge into explicit knowledge and by making a shared organizational context (the "Ba"). This in turn can foster individual and organizational learning enabling the reconfiguration of new knowledge. According to Lilleore and Hansen (2011), "Knowledge sharing can positively influence organizational performance through sharing both tacit and explicit knowledge" (Lilleore & Hansen, 2011, p. 54). But it is very hard to combine tacit and explicit knowledge simultaneously as organizational learning capacity is limited. Thus, the choice to focus more on either knowledge exploration or exploitation is influenced by the internal knowledge bases and by the capability to absorb external knowledge. Several barriers can reduce the ability of organizations to share knowledge (Lilleore & Hansen, 2011; Riedge, 2005, 2007). Szulanski (1996) found that knowledge sharing could be inhibited by: i) lack of absorptive capacity within organizations; ii) casual ambiguity of the shared knowledge; iii) difficult relationship between senders and receivers. Riedge (2005, 2007) categorized knowledge sharing barriers into: i) individual barriers (e.g. apprehension or fear, ...); ii) organizational barriers (e.g. lack of leadership, ...); iii) technological barriers (e.g. lack of compatibility between diverse IT, ...). Most studies focus on the bright side of knowledge management: in principle, effective and purposeful sharing of knowledge translates into accelerated organizational performance. Only rarely do we see reports on the dark side. For example, Newell et al. (2001) emphasize that there is a potential to disable such processes.

2.3 MCS and knowledge inhibition

A key contribution to understand MCSs is the work of Simons (1995, 2000). The author defines management control systems as "formal, information-based routines and procedures managers use to maintain or alter patterns in organizational activities" (Simons, 1995, p.5). Other studies highlight that the blend of aims MCSs pursue requires a combination of multiple control systems (Emmanuel, Otley, Merchant, 1990, Chenhall and Euske, 2007). Indeed, Simons argues that there are " [...] four key constructs that must be analyzed and understood for the successful implementation of strategy: core values, risks to be avoided, critical performance variables, and strategic uncertainties. Each construct is controlled by a different system or lever, the use of which [...] creates the opposing forces - the yin and the yang - of effective strategy implementation" (Simons, 1995, pp. 6-7). Simons defines four systems that are used to exercise control ("levers of control"; LOCs), which are usually articulated as: belief, boundary, diagnostic and interactive systems. The belief system is "the explicit set of organizational definitions that senior managers communicate formally and reinforce systematically to provide basic values, purpose and direction for the organization" (Simons, 1995, p. 34). In order to explain the beliefs function, the literature recognizes a fundamental role in communicating core values for inspiring and motivating all the parts of an organization (Wider, 2007). As a consequence of the correct use of the belief system, organizations are able to explore, create and use endeavor-engaging appropriate actions for coordinating all the efforts of the organization in the same direction. The boundary system "delineates the acceptable domain of strategic activity for organizational participants" (Simons, 1995, p. 39) and provides the organization with specific behavior constraints. Thus, all parts of the organization are able to understand what is (and what is not) permissible. The diagnostic system is intended to motivate components of an organization to align their performance with organizational objectives. Feedback and measurement systems involve actions such as score keeping and the analysis of deviations from standards as the basis for monitoring employee actions. The collected information actions allow the analysis of the progress towards goals and to take corrective action when necessary (Mundy, 2010). Finally, the interactive system is forward-looking and is characterized by active and frequent dialogue between top managers and middle managers through debate about organizational strategic problems and their possible solutions. It implies a proactive, non-invasive problem solving approach focused on strategic uncertainty. According to this literature, the levers of control generate a "dynamic tension between opportunistic innovation and predictable goal achievement that is essential for positive growth" (Simons, 1995, p. 153).

Starting from an assumption that the management of intellectual assets has a broad competitive implications, literature on management control has analyzed the role and the use of MCSs in several fields of research: i) innovation at the organizational level (Jørgensen & Messner, 2009); ii) research and development organizational units (Brownell, 1985); iii) new product development (Davila, 2000); iv) new service development (Gilson et al., 2005). The empirical findings surrounding the broad context of the role of management controls in highly knowledge environments, have demonstrated that MCS can affect the effectiveness of knowledge and intellectual capital management (Davila, 2000). This is an important point because, even if MCSs are expected to support value generation processes, in highly knowledge-driven environments they can have counterproductive effects (Ditillo, 2004, 2012). For example, the studies on research and development organizations have recognized that accounting controls constrain, or are irrelevant, in R&D settings because financial indicators have a minor role to play in field qualified by a high level of uncertainty (Hayes, 1977). By adopting a broader definition of control mechanisms, Abernethy and Brownell (1997, p.245) have demonstrated that “reliance on accounting controls has significant positive effects on performance only when task uncertainty is lowest” while “behavior controls appears contribute to performance in no situation”. Literature on product innovation lacks clarity about the effect of the use of control mechanism on product development performance. Eisenhardt & Tabrizi (1995) have suggested that the relationship between the use of MCSs and new product development performance does not exist or is negative. Otherwise, scholars have demonstrated that when MCSs are used as repositories of information directed to people coordination and the stimulation of organizational learning they affect the development of new product in a positive manner (Koga & Davila, 1988; Nixon, 1998). In general terms, MCSs that impose rules and constraints on people behavior in order to move towards a set of pre-defined objectives, seem to inhibit the creation of the playing field where knowledge emerges and can be shared throughout the organizational levels. For overlapping this imbalance, it is necessary to take into consideration a different interpretation of the role of MCS. Moreover, they should be considered as information tools (Hartmann, 2000) or as knowledge coordination and knowledge integration mechanisms (Ditillo, 2004, 2012).

2.4 Connecting knowledge barriers, MCS and intellectual liabilities

IC and KM have a mutual interaction (Dunkelberg, Moore, Scott, & Stull, 2013; Seleim & Khalil, 2011; Shih et al., 2010; Zhou & Fink, 2003). While KM is used to develop and maintain IC (Y.-C. Huang & Wu, 2010; Seleim & Khalil, 2011), IC increases the absorptive capacity of the organization (Cortini & Benevene, 2010; Seleim & Khalil, 2011). More precisely, socialization can facilitate the conversion of new tacit knowledge and involves accumulation of HC and RC sharing and transferring experience. The conversion of tacit knowledge into explicit knowledge can create an accumulation of SC and enhances systemic institutionalized knowledge (Von Krogh et al., 2000). Companies with a strong SC can easily transfer knowledge that is created and embedded within papers and formal tools like software, databases, and so forth. The mutual influence of IC on knowledge sharing and, vice versa, has been empirically studied by Seleim and Khalil (2011) at 38 Egyptian software firms. It is important to notice that KIFs represent a specific domain where the complexity of the tasks requires the application of a great amount of differentiated knowledge bundles. In order to better avoid severe problems in understanding customers' requests, solving articulated problems and generating creative solutions which are able to configure new products and services, knowledge needs to be integrated and distributed effectively throughout the organization to stimulate creativity and innovativeness (Davila & Ditillo, 2013). In such type of firms, the use of MCSs as behavioral control is prevented in part by the lack of observability of tasks and in part by the continuously changing configuration of actions. They are characterized by a more complex and multifaceted nature that increase the number of exceptions compared to the standardization of financial and non-financial controls available for coordinating and controlling results, actions and personnel (Ditillo, 2004). As already suggested, this role of MCSs stimulates a strong emphasis on control procedures that could inhibit knowledge transfer as people must demonstrate they are able to achieve the pre-defined goals. Otherwise, if these control mechanisms that build the structure of the environment in which people can cultivate their knowledge sharing, are integrated with mechanisms directed at facilitate knowledge transfer and diffusion, then knowledge behaviors can be enhanced and fruitfully directed to a positive engagement into knowledge transfer.

2.5 Research questions

When it comes to the dark side of knowledge sharing, it is about the roles of IC in creating value and of ILs in destroying value. Value creation and value destruction develop along different paths (Giuliani, 2013). In this study we aim to reach a better understanding of the connections between knowledge barriers (KBs), control mechanisms (MCSs) and intellectual liabilities (ILs). We explore the following research questions:

Research question 1: How do MCSs influence the development of knowledge barriers and thus of intellectual liabilities?

Research question2: What are major similarities and differences between the cycle appropriate use of Management Control => knowledge sharing and the cycle inappropriate use of management control => knowledge sharing barriers?

3. Methodology

By adopting a case study approach we document and gather detailed data that allows us to: i) develop tracking paths as to “how” specific decisions were taken and implemented (Yin, 1981); ii) analyze multiple observations on complex relational processes (Eisenhardt & Graebner, 2007); iii) draw the significance of various interconnected levels of analysis (Hall, 2006); iv) find similarities and differences by comparing our findings with previous theory (Ridder, Hoon, & McCandless Baluch, 2012). We aim to develop an “antagonistic positioning” (Ridder et al., 2012), which means that what we develop through our analysis is “framed towards theory that – although sharing a proximal phenomenon of interest – remains distinct from the focal theory domain” (Ridder et al., 2012, p. 7). The object of our case study is a leading global company in the field of engineering consultancy labeled “Engineering Ltd.” (EL) who has more than 10,000 employees. EL has followed a path of mergers and acquisitions in order to enlarge its presence in the marketplace. As pressures grew to increase revenue, and as new markets emerged globally, increased attention began to be paid towards knowledge sharing.

Our methodological approach differentiates our study from previous empirical research on the field for several reasons. First, we conducted an in-depth analysis of knowledge management orientation in the company through using content analysis of its strategic plan (as this has a specific section on Knowledge Sharing). We analyzed internal documents in order to understand how the commitment to managing knowledge- sharing processes is distributed within the organization. Secondly, we examined the company procedures for knowledge sharing and we investigate the role of adopted MCSs. Third, we sent out a semi-structured questionnaire to 12 top managers located throughout the world in order to capture their point of view on knowledge sharing and on the effectiveness of MCSs on knowledge management. We believe this approach allows us to seek complementarities versus dissimilarities in theory building. More precisely, we focus on how knowledge barriers (KB) and control mechanisms (MCSs) contribute to the development of ILs. Our approach searches for similar and different paths of evolution comparing: i) the relationship between KB and ILs; ii) the relationship between MCSs, KB and ILs; iii) the theoretical relationship reported in previous studies between KS, MCSs and IC. By comparing similarities and differences between the cycle IC-KS and the cycle ILs-KB-MCSs we aim to contribute to the literature on intellectual liabilities formation.

4. Findings

Focusing on personal knowledge barriers. The role of MCSs

Having the right knowledge in the right people is one of the most common issues in knowledge management. Barriers originating from individual behavior or perceptions can relate to either individuals or groups within or between business functions. According to the interviewees, Engineering Ltd suffers from several personal barriers which impede effective knowledge sharing. One major problem is lack of time. The employees are more focused on “billable hours” since it is perceived these are the most recognized hours. Several individuals stated that when business is good, people are very focused on their daily routines, and the whole organization is focused on productivity. Managers recognized that:

"We are under pressure, they tend people want to do chargeable work rather than to share knowledge. We have Technical Communities, but they need a dynamic leader that drives them. And it is hard to find such leaders since leading a TC requires a lot of commitment that goes beyond your daily routine and chargeable hours."

Moreover, the company suffers from a general fear of sharing, which contradicts Engineering Ltd being a ‘knowledge-intensive’ firm. In order to overcome this hurdle, Engineering Ltd developed several tools that allow employees to share knowledge, particularly knowledge embedded in reports. But the managers stated :

"A very important personal barrier is the fear of being wrong when people share...Just few people bring original stuff in there, but not because they don't know just because sometimes they don't want so we have to spend a lot to educate our new employees with knowledge that we already own."

The immediate impact of this situation is a growing reduction in human capital. 'Hidden' knowledge reduces the opportunity for growing employee competencies not only at local level but also in a global perspective. Thus, a depreciation of human capital was combined with a significant risk that hidden knowledge could leave the company or, worse, the company would be forced to reproduce knowledge that already exists.

Focusing on the use of MCSs within the company we observed a prevalent use of diagnostic tools. It is important to highlight that when MCSs are employed diagnostically, they are used to compare actual results with a pre-defined set

of goals. The diagnostic use of MCS is targeted to identify exceptions and deviations from planned behavior. But, as reported by managers, this use of MCS in highly knowledge environments constrains manager's behavior because the monitoring process reduces intrinsic motivation and has a negative impact on knowledge sharing throughout organization. Indeed:

"People have a general fear of being wrong due to the existence of a review system that validates contents brought by users to the platform."

"We can't spent time for knowledge sharing among colleagues because this time is not monitored by review systems and then if we dedicate time to knowledge sharing we can't hit the budget target."

Traditional approaches to control focus on specific guidelines that specify the required outcome for each project without explicitly consider the time spent for knowledge sharing as a key deliverable. The side effect of this approach creates operating constraints that reduce the adoption of behaviors orientated towards knowledge sharing. Thus, diagnostic controls can assume an inhibitor role in highly knowledge environment when they are mostly build around variance and exception reporting that are used for reducing the level of freedom and, then, the interaction between individuals.

4.1 Focusing on organizational knowledge barriers. The role of MCSs

Engineering Ltd acknowledged that it has several organizational knowledge barriers. For example, time spent for sharing knowledge is not traceable nor is it captured by any time/activity sheet tool. Also, sharing knowledge is considered irrelevant for career improvements and incentives with rewards for promoting collaboration and knowledge sharing being weak. The managers stated:

"Knowledge sharing tends to be more just a day-to-day thing that happens, people don't report it. Everybody can participate in Technical Communities, but none calls that part of the job...Individuals spend time in sharing knowledge, for example senior people share knowledge with junior people, room training, etc., because they feel it is a personal mentoring role. But if you make this part of the individual assessment, you get a better chance of people doing things more effectively."

Even though the company has a strategic plan with a dedicated section on knowledge sharing, this is poorly communicated as no strategic statements are shared among business functions. Despite introducing specific tools for fostering knowledge sharing, there are no performance-measurement tools that can be utilizes in order to verify improvements. Several internal documents reported:

"Major improvements required are an effective integration of the organizational impact assessments. Our communication action plans will need to include touch points for aligning our communication among all management levels in order to fill this gap and make appropriate linkages in our messaging to inter-related initiatives."

The confusion about the importance of knowledge exchange has turned corporate intellectual capital into intellectual liabilities. As a consequence, Engineering Ltd suffered from increased employee turnover as employees were unaware as to expectations. Therefore, firm human capital has depreciated which may become the intangible that leads to organizational deterioration. Moreover, poor communication on knowledge sharing decreases the propensity to use knowledge repository tools.

These constraints are an inevitable consequence of the prevalent use of coercive controls as opposed to enabling controls for cultivating a knowledge sharing culture. This is done by providing people with limits within which managers are expected to operate, but they are not able to diffuse knowledge at lower levels of organizations. In sum, the control mechanisms are aimed at protecting the organization from financial risks but they don't encourage a knowledge oriented atmosphere in people, favoring active efforts for knowledge transfer and the search for opportunities and smart solution to complex problems. Now in *Engineering Ltd* the autonomy and intrinsic motivation that the knowledge sharing requires cannot be easily integrated with organizational boundaries that MCS impose and there is a strong tension between the inclination of people to be knowledge-oriented and the control logic that qualifies the achievement of goals within the overall budget. In sum, the apparently obvious implication is that knowledge-sharing and control are incompatible and, as a consequence, MCSs can have a negative impact on knowledge behaviors facilitating the accumulation of ILs.

4.2 Focusing on Technological knowledge barriers. The role of MCSs

Engineering Ltd is aware of technological knowledge barriers. In fact, the company has developed a strong social orientation by pushing social networking, blogging, setting up social-network platforms (with added capabilities such as project-shared workspaces),and group events. However, this created unrealistic expectations about what could be

done. There was a growing use of social network platforms, but this only served to create an increased flow of repetitive information. Instead of searching within the existing knowledge base employees began raising questions through the social-network platforms. Time was spent communicating knowledge already available in other tools, or which was valueless and consumed employees' daily routines, thereby increasing cost and reducing efficacy. The unrealistic expectations exhibited drove non-monetary inefficiencies with the employees causing (unwittingly) value deterioration. Quoting some of the managers:

"Looking at our social network tool you can see the same questions that are asked again and again, causing a general abuse of time for people that ask questions and people who answer them."

At the same time, the design of available technological tools is questioned because some tools are not able to motivate employees to implement knowledge-oriented behaviors. They are used to store bundles of standardized knowledge and are incompatible with the inclination for individuals to be creative and explicitly oriented towards knowledge creation. For example, one manager stated:

"Just downloading documents is not going to work. You have to find other ways to transfer knowledge, as formal courses, doing classes. You can download only formal knowledge, not the tacit one. That's why they should specifically change the operating model, that is to say change the roles, responsibilities and accountabilities of the senior people, so that you can have much structure around the transfer-knowledge. The barrier right now in the organization is that there is not a supporting operating model that helps the knowledge sharing: people have to be rewarded and recognized, people like to do things when the organization recognizes them for doing well."

This situation is reinforced by the acknowledged emphasis on the suppression of an interactive use of IT tools. At *Engineering Ltd*, the interaction among individuals is only partially facilitated by IT tools because MCSs do not take into consideration that knowledge sharing depends mainly on the inclusion of people in groups and other social dimensions. As stated, knowledge sharing software can induce people to post redundant questions instead of looking for available knowledge resources, not to spread knowledge that is already available in other tools, or spread knowledge that is valueless, all of which consumes employees' daily routines, thereby increasing cost and reducing efficacy. Therefore, the lack of interactions within and among organizational levels negatively affects knowledge sharing and contributes to generate ILs.

5. Discussion

Our findings show that human liabilities are generated by personal barriers, organizational barriers and technological barriers in a knowledge-intensive firm. The failure to share, the absence of clear organizational aims, and the introduction of MCSs targeted to define organizational boundaries and monitoring exceptions and deviations from a set of pre-defined objectives, reduce and destroy the power of intellectual material where there is a low level of knowledge into the activities devoted to generate smart solutions to complex problems. In a highly knowledge-driven environment, the reliance on MCS can generate significant negative effects on performance. The main consequences are: i) increasing in people turnover, thus boosting human capital deterioration; ii) increasing of hidden knowledge, causing IC depreciation and organizational deterioration; iii) generating a non-monetary obligation for employees who are led to use some tools, but do not use it properly. These results show a partial difference with previous studies on the connection between KM and IC. Studies by Seleim and Kahlil (2011) and Hsu and Sabherwal (2012) did not find a significant connection between knowledge sharing and human capital. Both studies speak of an inverse relationship where human capital enhances knowledge sharing. Different results were reached by Shish et. al. (2010) for the banking sector. They found a significant positive correlation between knowledge creation and human capital. By logic, repeated application of knowledge in a given task fosters learning by people and organizations (Eisenhardt & Martin, 2000). So, while the theoretical approaches point to a positive connection between knowledge sharing and human capital, empirical results seem to be contradictory. Moving from the 'bright' side to the 'dark' side, our results seem to indicate that knowledge barriers can produce human liabilities and empirical evidence supports this approach.

Moreover, according to our results when MCSs are designed and used for behavioral controls, they contribute negatively to knowledge sharing and the employees perceived financial measures of performance to be inappropriate for fostering a knowledge-oriented behaviors. Indeed, complex, tasks with high levels of autonomy, knowledge contents and skills variety require the combination of both controlling and enabling uses of MCS (Mundy, 2010). This is especially true for those organizations facing complex problems and uncertainty as knowledge-intensive firms. Accordingly, an understanding of how to create a dynamic tension between controlling and enabling uses of MCS in order to generate knowledge sharing and, thus, enhance IC accumulation represents an important challenge for any KIF. The capacity to make a smart balance is dependent on organizational and individual attributes. Focusing on the effect on organizational barriers, we are able to face a double variety of considerations. On one hand, lack of time can

reduce stored knowledge and harm problem finding attitudes within the organization, which then deteriorates organizational capital and thus creates intellectual liabilities. On the other hand, the increase of valueless information flows reduces the effectiveness of organizational processes and constitutes to IL development as non-physical cause of organizational deterioration. This result seems to be partially in line with previous studies which found that knowledge conversion from tacit to explicit knowledge leads to an increase in the overall organization's IC (Ikujiro Nonaka & Takeuchi, 1995). Hult et. al. (2004) showed that information distribution can affect shared meaning within the organization, influencing both human capital and organizational capital. Interestingly, prior empirical studies did not fully show a statistically significant connection between knowledge sharing and organizational capital (Hussi, 2004; Seleim & Khalil, 2011).

Our findings corroborate that relational liabilities are generated by personal and organizational barriers. Hidden knowledge can cause relational capital deterioration and reduce the sharing and usage of relationships among branch offices. Relational capital can be damaged, and the company's overall organization can be deteriorated. This seems to be completely in line with previous studies on the connection between KM and IC. Moreover, it is important to recognize that the lack of an interactive use of MCS reduces the possibility to bring together individuals with different set of knowledge contents. In this way the access to local and dispersed knowledge that can be used to renew and ameliorate tasks and activities is reduced. As a consequence, individuals do not keep abreast of the activities of colleagues thereby constraining discussing and solving problems in a facilitative and social way. This is a particularly critical aspect for KIFs because the benefits attained from the interactive use of MCS are not taken into consideration and they are out of the managerial control. In contrast to a controlling use of MCS, the interactive systems tend to be time-consuming and costly. For this reason, it is fundamental that knowledge sharing is explicitly incorporated into MCS in order to enhance the commitment to continuously search for new opportunities and solutions (Mundy, 2010).

A company's value is dependent on the ability to create an effective knowledge sharing process which enables the use of knowledge that is embedded with its partners (Kianto, Hurmelinna-Laukkanen, & Ritala, 2010). Moreover, the rate at which organizations access and reuse knowledge influences the effectiveness of knowledge transfer (Watson & Hewett, 2006) and thus contributes to create trust between network members, which increases relational capital. Seleim and Kahlil (2011) found a statistically significant connection between knowledge sharing and relational capital that was not recognized for other forms of connections between KM and IC. This could be translated into the connection between KB and ILs. In fact, failures to satisfy external actors' non-monetary obligations might cause a depreciation of company's relational capital (Garcia-Parra et al., 2009). Table 1 summarizes main results of our study.

Table 1: Overview of the dynamics of interrelation among knowledge barriers, MCSs misuse and intellectual liabilities

Knowledge barrier	MCS misuse	Intellectual liability
Personal knowledge barriers: <ul style="list-style-type: none"> Lack of time Fear of sharing 	Misuse of belief, boundary, diagnostic and interactive systems <ul style="list-style-type: none"> Excessive attention on billable hours Unreportable time for knowledge sharing Absence of communication on the importance of knowledge sharing Absence of impact of knowledge sharing in people carriers 	Human, relational and organizational liabilities <ul style="list-style-type: none"> High people turnover Need to duplicate knowledge that already exists within the company Hidden of knowledge not used Useless flows of information Reduced valuable flow of information
Organizational knowledge barriers <ul style="list-style-type: none"> Absence of a reward system Absence of communication on aims and core values 		
Technological barrier <ul style="list-style-type: none"> Flow of useless information Ineffectiveness of codified knowledge within database and procedures 		

6. Conclusion

This article addresses the connection between knowledge barriers and management control systems analyzing how an improper use of them can lead to intellectual liabilities development. Our paper aims to offer a new perspective on the destructive side of IC and KM. Personal barriers, organizational barriers, and technological barriers are recognized not only as walls to knowledge sharing, but as real producers of intellectual liabilities. Bad practices connected with the improper use of MCSs can facilitate this disruptive process. Our findings have implications for both academic and managerial audiences

From an academic perspective, our paper aims to investigate if an improper use of MCSs can lead to knowledge barriers and further to intellectual liabilities. Our results build on existing literature proposing insights on the disruptive side of control answering to our research question 1 and finding a significant relationship between the improper use of MCSs and KB. Moreover using an “antagonistic positioning” we build on existing literature answering to research question 2 management control => knowledge sharing barriers and extending literature developed within the bright side to the dark side of this connection.

On a managerial perspective, our paper aims to help managers to better identify risks connected to an improper use of MCSs, recognizing main impacts on KB and IL's. Through our paper managers can measure the risk and impacts in order to evaluate appropriate actions for their reduction.

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